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Studies of West Indian plants — III

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12. THE WEST INDIAN SPECIES OF COMOCLADIA P. BR.

COMOCLADIA* P. Br.; L. Syst. ed. 10, 861. 1759

Type species: *Comocladia pinnatifida* L.

1. Leaves entire or undulate.
   A. Glabrous species.
      a. Lateral leaflets distinctly stalked.

1. COMOCLADIA PINNATIFIDA L. Syst. ed. 10, 861. 1759

Comocladia integrifolia Jacq. Enum. Pl. Carib. 12. 1760.

TYPE LOCALITY: Jamaica.

Both names are based wholly on P. Browne, Hist. Jam. 124, where the generic name is printed *Comocladia*. Browne refers to Sloane's description and figure of "Prunus racemosa, caudice non ramosa" (Hist. Jam. **2**: 131. *pl. 222. f. 1*); the illustration there given is not wholly satisfactory for the plant which has been taken for this species, but which is here accepted as usually interpreted.

DISTRIBUTION: Moist woodlands at middle and lower elevations throughout Jamaica; Haiti and Santo Domingo.

*The spelling of the generic name was changed by Linnaeus to *Camocladia*, but this form is here regarded as a typographical error, although it was continued by Linnaeus, in the second edition of Species Plantarum, and in successive editions of the Systema, but was changed back to the original by Gmelin (Syst. ed. 13. 1791). The original spelling was accepted by Jacquin, by Swartz, and by most subsequent authors.

[The BULLETIN for June, 1910 (37: 273–344. *pl. 33*), was issued 21 Jl 1910.]

2. **Comocladia Hollickii** sp. nov.

Low, flowering when not more than 1 m. high, the tallest plants seen not more than 3 m. high. Leaves 3–4 dm. long, glabrous; leaflets 17–21, distinctly petioluled, subcoriaceous in texture, undulate-dentate with acutish teeth, acuminate at the apex, obtuse or truncate at the base; lower leaflets ovate, 3–5 cm. long, middle leaflets (5 or 6 pairs) ovate-lanceolate to oblong, 6–9 cm. long, terminal leaflet broadly lanceolate, long-petioluled, 6–8 cm. long; petiolules of the lateral leaflets 1.5–3 mm. long; petioles 3–6 cm. long; inflorescence glabrous, short, about 8 cm. long, sparingly branched, narrow; pedicels 1 mm. long or less; corolla-buds 0.5 mm. in diameter, purple; sepals and petals obtuse, rounded; filaments twice as long as the anthers.

Rocky hillside, Bluefields Mountain, Jamaica, at 500 m. altitude (*Britton & Hollick 2000*, March, 1908, type); wooded hill, Potsdam, Santa Cruz Mountains, Jamaica (*Britton 1271*).

3. **Comocladia grandidentata** sp. nov.

A slender tree, up to 10 m. high. Leaves glabrous, about 8 dm. long; leaflets about 29, petioluled, thin in texture, coarsely irregularly dentate with obtuse or acutish teeth, acute or abruptly acuminate at the apex, obtuse or subtruncate and more or less oblique at the base, the lower 4 or 5 pairs ovate, 3.5–6 cm. long, the others oblong, oblong-lanceolate or somewhat oblong-oblanceolate, 7–11 cm. long, 2.5–4 cm. wide; lateral petiolules 2–3 mm. long; flowers and fruit unknown.

Hopeton, Westmoreland (*Harris 9944*, Sept. 19, 1907).

4. COMOCLADIA EHRENBERGII Engler, Bot. Jahrb. 1: 420. 1881

TYPE LOCALITY: Santo Domingo.

DISTRIBUTION: Santo Domingo.

Note.—Known to me only from the description. A glabrous species, its leaves with only two pairs of entire ovate short-petioluled leaflets.

b. Lateral leaflets sessile or subsessile.

5. **Comocladia parvifoliola** sp. nov.

A tree, up to 10 meters high, glabrous throughout. Leaves 1–2 dm. long; leaflets 7–11, coriaceous, entire, sessile, or on petiolules 1 mm. long or less, rounded or subcordate at the base, acute or bluntly short-acuminate at the apex, the lowest pair ovate,

2–4 cm. long, the others oblong or oblong-lanceolate, 4–7 cm. long; panicles very slender, as long as the leaves or longer; flowers minute; sepals broadly ovate, obtuse; petals twice as long as the sepals, oval-orbicular, rounded; stamens a little shorter than the petals.

Woodlands, Dolphin Head Mountain, Jamaica (*Britton 2473*, March, 1908, type; *Harris 10,267*).

6. COMOCLADIA CORDATA N. L. Britton, Torreya 7: 6. 1907

TYPE LOCALITY: Troy, Jamaica.

DISTRIBUTION: Known only from the type locality.

B. Pubescent species.

a. Lateral leaflets distinctly stalked.

7. COMOCLADIA PUBESCENS Engler, Bot. Jahrb. 1: 420. 1881

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Jamaica, in woodlands at lower and middle elevations in relatively moist districts.

8. **Comocladia jamaicensis** sp. nov.

Low, about 2 meters high. Leaves 3–4.5 dm. long, the rachis loosely pilose; leaflets about 21, thin in texture, distinctly petioluled, obtuse or subtruncate at the base, acute to acuminate at the apex, glabrous above, sparingly pubescent on the veins beneath, undulate-dentate or some of them nearly entire; lateral petiolules 2–3 mm. long; lower two or three pairs of leaflets ovate, 3–5 cm. long, the others lanceolate, ovate-lanceolate or oblong, 5–10 cm. long, 1.5–4 cm. wide; inflorescence puberulent, shorter than the leaves, about 3 dm. long, its branches short and slender; sepals and petals obtuse; young stamens with filaments not longer than the anthers.

On dry rocky hill, Green Island, Jamaica (*Britton & Hollick 2132*, March, 1908, type; *Harris 10,250*).

b. Lateral leaflets sessile or subsessile.

9. COMOCLADIA VELUTINA N. L. Britton, Torreya 7: 6. 1907

TYPE LOCALITY: Great Goat Island, Jamaica.

DISTRIBUTION: Jamaica, on very dry rocky hillsides and sand dunes near the southern coast, Healthshire Hills to Great Pedro Bay.

Note.—Recorded by Grisebach from Jamaica as *C. propinqua*, which it little resembles.

10. **Comocladia pilosa** sp. nov.

A tree, 6 meters high, the young twigs, leaves, and inflorescence densely pilose-pubescent. Leaves about 7 dm. long; leaflets about 19, chartaceous, dark green above, paler beneath, entire-margined, the lateral ones sessile, or on petiolules about 1 mm. long, cordate or subtruncate at the base, obtuse, acutish or abruptly short-acuminate at the apex; lowest pair of leaflets suborbicular, 4–5 cm. long; second and third pairs ovate-orbicular, 5–8 cm. long, the others oblong or ovate-oblong, 9–14 cm. long, 4–5 cm. wide; terminal leaflet long-stalked; panicles several, shorter than the leaves, 2.5 dm. long or less, the branches rather stout; calyx with a few scattered hairs, the sepals rounded; petals a little longer than the sepals, rounded; filaments twice as long as the anthers.

Wooded hill, Union Hill, near Moneague, Parish of St. Ann's, Jamaica (*Britton & Hollick 2762*, April, 1908).

11. COMOCLADIA UNDULATA Urban, Symb. Ant. **5**: 401. 1908

TYPE LOCALITY: Martinique.

DISTRIBUTION: Known only from Martinique.

2. Teeth of the leaves bristle-tipped.

A. Glabrous species.

12. COMOCLADIA PLATYPHYLLA A. Rich.; Griseb. Cat. Pl. Cub. 68. 1866

TYPE LOCALITY: Cuba [*Rugel 277*, the type specimen, is from Matanzas].

DISTRIBUTION: Cuba, at lower altitudes, provinces of Oriente, Camagüey, Santa Clara, Matanzas, and Havana.

Note.—Lower leaflets ovate, the others mostly oblong. Engler (DC. Mon. Phan. **6**: 365) describes a specimen with all the leaflets ovate, long-stalked, and with only 3 or 4 teeth on each margin. The number of teeth is often 9 on each margin. The species consists of a number of races, differing in width of leaflets, length of petiolules and number of teeth on the leaf-margins, the extremes appearing quite different from each other.

A. Richard (in Sagra, Hist. Cub. **10**: 155. 1850) remarks

as follows concerning this species, which was subsequently described by Grisebach:

"I have observed an example of this tree, but without flowers, which, it seems to me, could form, if not a distinct species, which I am not far from believing, at least a very notable variety. The leaflets are almost as large as the leaves of the 'castaño,' are also rough on both faces, dentate and spine-like in their contour; and, in short, recall in all their shape the leaflets of *Comocladia dentata*, but are much larger and rougher. If the opportunity comes to see this plant with flower and fruit it will perhaps be possible to form a distinct species to which the name *Comocladia platyphila** will apply perfectly."

13. COMOCLADIA INTERMEDIA C. Wright; Engler in DC. Mon. Phan. **4**: 366. 1883

TYPE LOCALITY: Cuba. [Wright's specimen in the Kew Herbarium is from Trinidad, Cuba.]

DISTRIBUTION: Southern coast of Santa Clara Province, Cuba, in dry districts.

14. **Comocladia acuminata** sp. nov.

Leaves about 1 m. long, glabrous. Leaflets about 31, chartaceous, short-petioluled, the lowest ovate to ovate-lanceolate, 5–6 cm. long, the others oblong-lanceolate, 10–14 cm. long, 3–4 cm. wide; slenderly acuminate at the apex, broadly cuneate at the base, serrate with about 8 bristle-tipped teeth on each margin, the veins prominent on the underside, diverging nearly at right angles from the slender midvein, the under surface paler green than the upper; panicles 4 dm. long, glabrous, slender, their branches widely diverging, 8–12 cm. long; flowers 4-parted, about 1.5 mm. broad.

Santo Domingo (*Wright, Parry & Brummel 192*, in United States National Herbarium).

B. Pubescent species.

15. COMOCLADIA GLABRA Spreng. Syst. **1**: 176. 1825

TYPE LOCALITY: Porto Rico.

DISTRIBUTION: Porto Rico, at lower and middle elevations

*Doubtless a misprint for *platyphylla*.

in moist and wet districts. Recorded by Engler from Santo Domingo and from Cuba.

The inflorescence, leaf-rachis, and venation of this species are sparingly pubescent. The races differ greatly in the length of the spiny tips of the teeth of the leaflets.

16. COMOCLADIA DENTATA Jacq. Enum. Pl. Carib. 12. 1760

Comocladia propinqua H. B. K. Nov. Gen. 7: 16. 1824.

Comocladia dentata propinqua Engler, in DC. Mon. Phan. 4: 364. 1883.

TYPE LOCALITY: Near Havana, Cuba (according to Jacq. Stirp. Am. 13. *pl.* 173).

DISTRIBUTION: Woodlands at lower elevations, provinces of Camagüey, Havana, Matanzas, and Santa Clara, Cuba, ascending to 420 meters on the Trinidad Mountains; Santo Domingo.

Field observations indicate that *Comocladia dentata* and *C. propinqua* can not be held as distinct species; the leaflets vary from narrowly lanceolate to broadly ovate, and from sharply spinulose-dentate to nearly or quite entire. The tree becomes 6 meters high in Santa Clara, Cuba.

Note.—*Comocladia dentata brevifolia* Engler, in DC. Mon. Phan. 4: 364. 1883.

I have not seen this plant, described as from "Domingo" it may be the same as the following species.

17. **Comocladia domingensis** sp. nov.

Twigs densely short-pubescent. Leaves about 2 dm. long, the rachis densely short-pilose; leaflets 17–19, ovate to ovate-elliptic, sessile, chartaceous, obtuse at the apex, rounded or subtruncate at the base, glabrous and rather dark green above, pilose on the prominent veins and light green beneath, the lower ones 1.5–2.5 cm. long, the others 4–5 cm. long, 2–3 cm. wide, serrate with 7 or 8 spinulose-tipped teeth on each margin and spinulose at the apex; panicles narrow, slender, loosely pilose, about 13 cm. long; flowers 4-parted; sepals orbicular, 0.5 mm. long; petals ovate, obtuse, 1 mm. long; stamens much shorter than the petals.

Santo Domingo (*Wright, Parry & Brummell 190*, in United States National Herbarium).

18. **Comocladia Dodonaea** (L.)

Ilex Dodonaea L., Sp. Pl. 125. 1753.

Comocladia tricuspidata Lam. Mém. Acad. Sci. Paris **1784**: 347. 1787.

Comocladia ilicifolia Sw. Prodr. 17. 1788.

TYPE LOCALITY: "America meridionalis."

Plumier's *plate 118, f. 1*, identifies this species beyond doubt.

DISTRIBUTION: Santo Domingo (according to Engler); Porto Rico, at low elevations in dry districts; Culebra; St. Thomas; St. Croix; Montserrat; Antigua; Guadeloupe; Mustique Island, Grenadines.

Note.—This species is the monotype of the genus *Dodonaea* (Plum.) Adans. 1763.

13. THE GENUS VIBURNUM IN JAMAICA

1. VIBURNUM VILLOSUM Sw. Prodr. 54. 1788

Hillsides and woodlands in moist and wet districts, at middle and higher altitudes, ascending to 2300 meters in the Blue Mountains.

The species apparently consists of numerous races, differing in the amount of stellate pubescence, in the shape of the fruit, and in the length of the stamens. Very densely tomentose bushes grow in proximity to slightly pubescent ones about Cinchona.

2. **Viburnum arboreum** sp. nov.

A tree, 15 m. high, with a straight trunk and spreading branches. Leaves chartaceous, entire, oval-elliptic, dull green, glabrous or sparingly stellate-pubescent above, loosely stellate-pubescent beneath, 8–12 cm. long, 5–6.5 cm. wide, short-acuminate at the apex, unequally narrowed or obtuse at the base, the veins about 6 on each side of the midvein, the stout petioles stellate-pubescent, 1–2 cm. long, inflorescence stellate-pubescent, 8–12 cm. broad; fruiting pedicels 3 mm. long or less; fruit oblong, 9–10 mm. long and 3 mm. thick when dry, narrowed at both ends, crowned by the ovate acute ciliate calyx-lobes and tipped by the base of the style.

Wooded rocky hill, Tyre, Cockpit Country (*Britton*, Sept. 13–18, 1906, *no.* 553, *type; Harris 9475*). *Harris 9403* from the same region, a shrub with white flowers, is probably this species.

3. VIBURNUM ALPINUM Macf. Fl. Jam. 2: 201. 1850

Hillsides and woodlands at middle and higher elevations in both relatively dry and wet districts, ascending to at least 1800 meters in the Blue Mountains. Erroneously regarded by Grisebach as identical with *V. glabratum* H.B.K. of Mexico and South America.

14. HITHERTO UNDESCRIBED SPECIES OF JAMAICA

Thrinax Rex Britton & Harris, sp. nov.

Trunk up to 20 meters high, cylindric, 2–2.5 dm. in diameter, sometimes swollen at the base. Leaf-blades of middle-sized trees 3 m. broad, silvery beneath, those of young plants sometimes 4 m. broad; leaf-segments 40–50, united to about one half, 3–5 cm. wide, notched at the apex into rigid acuminate narrow lobes 1–3 cm. long, revolute-margined, the midrib prominent on the under side; petioles very stout, compressed, 2-edged, as long as the blades or longer; ligule triangular, acute, 2–2.5 cm. long; inflorescence glabrous, much shorter than the leaves; bracts oblong, puberulent, with a triangular-acute apex; ultimate branches of the inflorescence rather stout, 10–12 cm. long; pedicels stout, 1.5–2 mm. long, about twice as long as the triangular acuminate bractlets; calyx hemispheric-campanulate, minutely toothed; fruit subglobose, 6–7 mm. in diameter; seeds brown, globular, shining, very nearly smooth, 5 mm. in diameter.

Eastern slopes of the John Crow Mountains at 450 to 600 meters altitude (*Britton 4151; Harris & Britton 10,759*).

Chamaecrista fasciata sp. nov.

Herbaceous, the roots apparently annual, the stems slender, erect, little-branched, 5–10 dm. high, more or less pubescent with long curled hairs. Leaves 8 cm. long or less, short-petioled; leaflets 20–40, linear-lanceolate, inequilateral, rounded at the base, acute and aristulate at the apex, strongly veined, ciliolate, but otherwise nearly glabrous, 10–12 mm. long, 1.5–2 mm. wide; stipules lanceolate-attenuate, strongly veined, 8–10 mm. long; gland scutellate, sessile, 0.5 mm. wide, borne on the petiole below the lowest pair of leaflets; peduncles a little shorter than the petioles, villous, the bracts ovate-acuminate, about 4 mm. long; sepals lanceolate, acuminate, villous on the back, about one half as long as the petals; flowers 1.5 cm. broad; ovary and young pod densely long-villous; mature pod linear, a little curved, some-

what narrowed toward the base, 4–5 cm. long, 5–6 mm. wide, obliquely short-beaked, loosely villous, black-banded over the spaces between the seeds and along both margins.

Bank, between Bath and Cuna-Cuna Gap, at 300 m. altitude (*Britton 3500*, September, 1908).

Meibomia umbrosa sp. nov.

Stem trailing, sometimes 1 m. long, densely villous to the base. Leaflets ovate to ovate-lanceolate, 6–10 cm. long, acute or acuminate at the apex, the lateral ones short-stalked, obliquely obtuse at the base, the middle one narrowed or blunt at the base and longer-stalked, all finely and rather densely pubescent beneath, sparingly pubescent above; petioles about as long as the leaflets, densely villous; stipules lance-subulate, about 1 cm. long; peduncles arising in the lower axils, as long as the leaves or longer, slender, pubescent, bearing a few distant lance-subulate bracts; flowers purple; fruiting racemes 1 dm. long or longer, the filiform pedicels spreading, about 2 cm. long; loment 1–3-jointed, the upper suture undulate; loment-joints obliquely oblong, nearly separated, uncinate, about 8 mm. long and 5 mm. high.

Shaded grassy hillside, Troy, Jamaica (*Britton 444*, Sept. 13–18, 1906, type); woodlands near Newport, Manchester (*Britton 3209*); nearest to *M. axillaris* (Sw.) Kuntze, which is nearly glabrous, with blunt leaflets.

Cissus (?) cucurbitacea Britton, sp. nov.

A woody, high-climbing vine, the stem up to 7.5 cm. thick at the base, the twigs and leaves fleshy. Leaves triangular-ovate, 6–10 cm. long, cordate at the base with a widely open sinus, 5-nerved and pinnately veined, remotely dentate with apiculate teeth, scabrous on both sides with short stiff hairs or when old papillose, the petioles 2–3 cm. long; tendrils slender, 1–2 dm. long.

Dry rocky hillside, Fort Henderson, Jamaica (*Britton & Hollick 1812*, March 2, 1908, type); base of Healthshire Hills (*Harris & Britton 10,512*).

An interesting xerophytic vine, of which we do not yet know either flowers or fruit.

Xylophylla contorta sp. nov.

A much branched shrub about 1 m. high, the main branches terete, the twigs flat and 2-edged. Phyllodes pale green, linear,

5–7 mm. wide at the middle, 6–10 cm. long, narrowed to both ends, acutish, many of them curved or falcate, finely and closely striate, the upper ones floriferous to below the middle, the crenatures 1-flowered, distant; stipules triangular-lanceolate, 2 mm. long or less; pedicels of pistillate flowers 3.5–4.5 mm. long, very slender, thickened above, sepals broadly ovate, obtusish, about 1 mm. long; fruit depressed, 3-lobed, obscurely reticulated, 3.5 mm. wide, nearly 2 mm. high; seed obovoid, 1.5 mm. long, minutely black-dotted.

Dry hillside, St. Ann's Bay (*Britton 2515*, March, 1908).

Tricera macrophylla sp. nov.

An erect virgate simple or sparingly branched shrub 1–2 meters high, with rough bark. Leaves narrowly elliptic or lanceolate-elliptic, very large for the genus, flat, 15–24 cm. long, 5–8 cm. wide, subcoriaceous, acute at both ends, the midvein stout, prominent beneath, impressed above, the veins numerous, slender, diverging nearly at right angles from the midvein and connected at 2–3 mm. from the margin, the ultimate venation finely and strongly reticulated, the stout petiole 1–1.5 cm. long; capsules brown, finely pubescent, 7–8 mm. long, woody, their recurved beaks 2 mm. long; inflorescence very short-stalked, lateral and supra-axillary; seeds linear-oblong, shining, 5 mm. long.

Woodlands, eastern and southeastern slopes of the John Crow Mountains at 500 meters altitude (*Harris & Britton 10,770*, March 11, 1909, type; *Britton 4173, 4193*).

Clusia silvicola sp. nov.

A tree, 12 m. high. Leaves firm, obovate, 13 cm. long, 7–8 cm. wide, firm, thick, dull, inconspicuously veined, rounded at the apex, cuneate-narrowed at the base, the midvein rather prominent beneath, the stout petiole 1 cm. long; fruit ovoid, white, 7 cm. long, about 5 cm. thick; sepals 4, broad; bracts much smaller than the sepals; stigmas 8, sessile, oblong-obovate, 8 mm. long, 4–5 mm. wide, with a slight depression near the base.

Wooded hill near Dolphin Head, Hanover, 400 m. altitude (*Britton 2330*, March 18–20, 1908).

Homalium integrifolium sp. nov.

A tree, about 15 m. high, the foliage glabrous. Leaves oblong-lanceolate, 10–15 cm. long, 4 or 5 cm. wide, entire-margined or with a few low crenatures, chartaceous, attenuate-acuminate at

the apex, obtuse or somewhat narrowed at the base, the midvein impressed above, rather prominent beneath, the primary veins about 12 on each side, the ultimate venation reticulated; petioles 6–8 mm. long; raceme 8–10 cm. long, its axis puberulent; pedicels 2–4 mm. long; hypanthium, sepals, and petals puberulent; sepals linear, acutish, 2.5 mm. long; petals ovate with a bluntish point, nearly 3 mm. long; stamens numerous; glands of the disk nearly contiguous; ovary depressed-globose.

Woodlands, eastern slopes of the southern end of the John Crow Mountains (*Harris & Britton 10,741*, March 10, 1909).

Anamomis grandis sp. nov.

A tree up to 13 meters high, the bark smooth, reddish, the branches gray, the young twigs sparingly pubescent. Leaves thin in texture, the blades pale green on both sides, not shining, copiously punctate, rather prominently veined, obovate, 4–6 cm. long, 2–4 cm. wide, obtuse or sometimes emarginate at the apex, narrowed or cuneate at the base, the midvein sparingly pubescent, impressed above, rather prominent beneath, the pubescent petioles 7–10 mm. long; peduncles slender, pubescent, 3–4 cm. long; cyme 3-flowered, the central flower sessile, the lateral ones on pubescent diverging pedicels 6 mm. long; hypanthium subglobose, appressed-pubescent; sepals concave, 2.5 mm. broad, rather broader than long, punctate, ciliate.

Dry rocky woodlands, Great Goat Island (*Harris 9307*).

Differs from *A. fragrans* (Sw.) Willd., of the Jamaica mountains, which has coriaceous, elliptic, shining, short-petioled leaves, and nearly erect pedicels.

Petesioides subverticillatum sp. nov.

A woodland shrub, 1–2 m. high, with slender branches. Leaves subopposite or subverticillate, sessile, oblong-elliptic to ovate-oblong, 5–14 cm. long, 6 cm. wide or less, cordate-clasping at the base with rounded auricles, acute or obtusish at the apex, indistinctly pinnately veined and slightly reticulated, punctate, the margins low-crenulate or entire; inflorescence bipinnate-paniculate, terminal, 4–6 cm. wide; pedicels rather stout, 1.5–3 mm. long; flowers 4-merous; calyx and corolla epunctate; staminate calyx 2.5 mm. long, its lobes semiorbicular-ovate, rounded, about one third as long as the tube; corolla as long as the calyx and similarly lobed; stamens nearly twice as long as the corolla; pistillate calyx 1 mm. long, the corolla a little shorter; staminodia half as long as the corolla; ovary ovoid; style short and stout;

fruit subglobose, red, 2.5 mm. in diameter, apiculate with the base of the style.

Woodlands, southeastern slopes of the John Crow Mountains, 350–600 m. altitude (*Harris & Britton 10,694*, type; *Britton 3937; Harris & Britton 10,701*); slopes, Cuna-Cuna Gap, *Britton 4049*)

Plumiera jamaicensis sp. nov.

An irregularly branched tree 8–10 m. high, the trunk up to 3 dm. in diameter. Leaves firm in texture, the blade elliptic, 12–15 cm. long, 5–7 cm. wide, rounded or emarginate at the apex, narrowed at the base, glabrous on both sides, or minutely puberulent on the veins beneath, the upper surface dark green with the veins somewhat impressed, the under surface lighter green with the broad nerves very prominent, diverging nearly at right angles from the strong elevated midvein, the ultimate venation strongly reticulated; petiole stout, 3–4.5 cm. long; peduncle stout, 18 cm. long or less; flowers numerous; bracts broadly ovate, acutish, 1.5 mm. long; pedicels 8–13 mm. long; calyx nearly truncate, with 5 short teeth; corolla white with a yellowish blotch at the base of each lobe, the tube 1 cm. long, the lobes 2–2.5 cm. long, oblong-obovate, obtuse; pods 15–22 cm. long, 1.5–2 cm. in diameter.

Coastal hillsides and thickets, parish of Portland. Wheelerfield, March 13, 1909 (*Britton 4123*, type); near Port Antonio, Sept. 25, 1906 (*Britton 870*). Near *P. emarginata* Griseb., of Cuba.

Valerianoides jamaicensis × mutabilis.

Hybrids are not often seen in the West Indian flora, but the one here recorded seems to be genuine. I found it growing near its parents on a roadside between Mandeville and Brown's Town, Manchester, with characters of foliage and flowers exactly intermediate.

Lantana jamaicensis sp. nov.

A vine, climbing on trees, up to 7 meters long, or shrubby and 1 meter high, or less, the branches long, slender, terete, densely puberulent. Leaves lanceolate to ovate, 2.5–9 cm. long, rather firm in texture, acute or acuminate at the apex, narrowed or rounded at the base, crenulate, sparingly pubescent above, densely puberulent and rather prominently veined beneath, or becoming glabrate, the petioles 1 cm. long or less; peduncles puberulent, 2–4 cm. long; heads involucrate, subglobose in flower, 1–1.5 cm.

in diameter, somewhat elongating in fruit; involucral bracts ovate to lanceolate, acutish, puberulent; corolla 6.5–10 mm. long, white or pale pink with a yellowish eye, puberulent, its lobes irregularly rounded; calyx-limb undulate, ciliate; stamens borne near the middle of the corolla-tube.

Banks and woodlands, Manchester and St. Elizabeth. Type from between Malvern and Stanmore Hill, Santa Cruz Mountains (*Britton 1097*, Sept. 3, 1907).

Apparently recorded by Grisebach as *Lantana stricta lilacina*, but it is not *Lantana lilacina* of South America. Certainly distinct from *Lantana stricta*.

Lantana arida sp. nov.

A widely branched shrub 1 meter high, or less, pubescent with long simple hairs and short glandular hairs intermixed; branches slender, 4-angled. Leaves ovate to oval, 1–2 cm. long, obtuse at both ends, or acutish at the apex, densely pubescent on both sides, rather firm in texture, crenate-dentate, the venation impressed above, prominent beneath, about 4 veins on each side of the midvein; petioles 2–3 mm. long; peduncles slender, longer than the leaves; inflorescence capitate; fruit oblong, 3–4 mm. long.

Dry rocky hillside, Salt Pond Hills, Kingston Harbor, in old fruit March 2, 1908 (*Britton & Hollick 1824*).

Rondeletia elegans sp. nov.

A tree, 5 m. high, the twigs densely appressed-pubescent. Leaves rather firm in texture, elliptic, the blades 11–16 cm. long, 9 cm. wide or less, glabrous above, sparingly pubescent on the veins beneath when old, quite densely pubescent beneath when young, acuminate at the apex, narrowed at the base, the midvein prominent beneath, with about 7 veins on each side, the stout pubescent petioles 2–4 cm. long; cymes axillary, pubescent, the peduncles about as long as the petioles; flowers all pedicelled; hypanthium hemispheric, pubescent, 1.5 cm. long; sepals narrowly lanceolate, pubescent, about as long as the hypanthium; corolla salverform, 10–14 mm. long, the cylindric crimson tube about twice as long as the 5 tawny-yellow obovate-orbicular undulate lobes; stamens sessile near the top of the corolla-tube; style 3 mm. long, pubescent below; fruit about 7 mm. long.

Woodlands, eastern slopes of the John Crow Mountains at 520 m. altitude (*Britton 4143*, March, 1909, type; *Harris & Britton 10,744*).

Rondeletia pallida sp. nov.

A tree, 10 m. high, the young foliage sparingly pubescent. Leaves thin, bright green, oblong-lanceolate to elliptic, 18 cm. long or less, 2–7 cm. wide, glabrous or with a few scattered hairs beneath and on the slender petioles when old, sharply acuminate at the apex, cuneate-narrowed at the base, the narrow midrib rather prominent on both sides with 4 or 5 pairs of veins on each side, the petioles 1–2 cm. long; cymes axillary; peduncles slender, a little shorter than the petioles; bractlets linear-lanceolate, pubescent, 2–3 mm. long; flowers in threes on the branches of the cyme, all on slender glabrous pedicels 3–5 mm. long; hypanthium hemispheric-campanulate, 1.5–2 mm. high; sepals triangular-lanceolate, acuminate, nearly as long as the hypanthium; corolla white or yellowish, fading brownish, 12–15 mm. long, salverform, glabrous or puberulent, the cylindric tube twice to three times as long as the 5 suborbicular, rounded, spreading lobes; stamens borne near the top of the corolla-tube, the filaments shorter than the anthers; style about 3 mm. long, pubescent below; stigma 2-lobed; fruit about 6 mm. long.

Woodlands, southeastern foothills of the John Crow Mountains, 350 m. altitude (*Britton 3992*, March, 1909, type; *3940; 4146; Harris & Britton, 10,680, 10,724*).

Guettarda constricta sp. nov.

A tree about 7 m. high, the twigs terete. Leaves broadly ovate; blades 17 cm. long or less, about two thirds as wide as long, rather firm in texture, glabrous and bright green above or puberulent on the veins, pale green or whitish and densely puberulent beneath, short-acuminate at the apex, obtuse or subtruncate and sometimes strongly inequilateral at the base, with 8 or 9 pairs of veins on each side of the prominent midvein; petioles stout, puberulent, 6 cm. long or less; peduncles axillary, somewhat angled, puberulent, as long as the petioles or longer; cymes several-flowered; fruit sessile, oval, finely puberulent, 10–12 mm. long, 8 or 9 mm. thick, obtuse at the apex, narrowed at the unequal base, distinctly constricted at the middle.

Wooded hillside, Grove Place, Manchester (*Britton 3769*, September, 1908). The fruit of *G. argentea* is globular.

Psychotria subcordata sp. nov.

A slender tree, 5 m. tall, the twigs and leaves glabrous. Leaves lanceolate to oblong-lanceolate, thin in texture, 7–10 cm. long,

2.5–3.5 cm. wide, sessile, subcordate at the base, acuminate at the apex, dark green above, paler beneath, the midvein rather prominent on both sides, the veins about 10 on each side of the midvein, diverging from it nearly at right angles, curving upward and united 2 or 3 mm. from the margins; stipules apparently distinct, deciduous; cyme sessile, 3-rayed, the rays slender, glabrous, 2.5–3 cm. long, the 2 or 3 raylets 1–1.5 cm. long; fruiting pedicels 2–5 mm. long; fruit globose-oblong, red, nearly 1 cm. long; pyrenae oblong, 8 mm. long, 4 mm. wide, strongly 3-crested longitudinally, with two shallow grooves on the nearly flat commissural side.

Woodlands, eastern slopes of the John Crow Mountains at 520 m. altitude (*Britton 4144*). Related to the Cuban *P. auriculata* C. Wright.

Lobelia grandifolia sp. nov.

Stem stout, somewhat pubescent, about 9 dm. high. Leaves flaccid, large, about 3 dm. long, 10–12 cm. wide, abruptly acuminate at the apex, cuneate at the base, crenulate all around, glabrous and dull green above, rather bright green beneath and pubescent on the veins, the broad flat midvein prominent, the numerous lateral veins arching upward; peduncles stout, pubescent, about 1.5 dm. long; raceme densely many-flowered, 1–1.5 dm. long; bracts linear-lanceolate, acuminate, glandular-serrate, nearly as long as the pedicels; pedicels about 2 cm. long; hypanthium campanulate, glabrous, 1 cm. long; sepals linear-lanceolate, glandular-serrate, 12–15 mm. long, 2 mm. wide; corolla yellowish white, greenish yellow, or brownish, glabrous, strongly curved, about 2.5 cm. long; androecium stout, pubescent, 1.5–2 cm. long; anthers 9 mm. long, loosely pubescent, two of them bearded at the tip.

Woodlands, eastern slopes of the John Crow Mountains at about 400 meters elevation (*Britton 4194*, type; *4197*; *Harris & Britton 10,725*). Related to *L. Fawcettii* Urban, in which the leaf-blade is decurrent on the petiole nearly or quite to the base, the sepals narrower and longer, the foliage glabrous or very nearly so.

Bidens Shrevei sp. nov.

Glabrous; stems woody, diffusely branched, reclining or straggling, 3–6 dm. long, the twigs striate. Leaves simple, ovate to lanceolate, 5–10 cm. long, acuminate at the apex, obtuse or subtruncate at the base, sharply serrulate, the slender petioles

one third to one half as long as the blades, the finely reticulate venation much darker in color than the parenchyma; heads several or numerous; peduncles 6 cm. long or less; involucre oblong-cylindric, about 1 cm. high, its bracts linear, spreading at anthesis, acutish and puberulent at the apex; rays oval to oblong, bluntish or emarginate, 1.5–2 cm. long, strongly veined; disk-corollas tubular-cylindric, narrowed below, 7–10 mm. long, with acute triangular-ovate teeth; anthers and style-branches slightly exserted; achenes linear, 12–16 mm. long, about 1 mm. thick, sparingly pubescent on the angles, the two yellowish awns 3–5 mm. long, downwardly barbed.

Banks at higher altitudes in the Blue Mountains; type collected by Forrest Shreve at Cinchona, November, 1905.

Chaenocephalus propinquus sp. nov.

A shrub, 2 m. high. Leaves firm in texture, oblanceolate, 5–9 cm. long, acute at the apex, cuneately tapering from above the middle to a sessile entire base, sharply and rather coarsely dentate above the middle, smooth on both sides or minutely scabrate-puberulent beneath, the pinnate venation not very prominent; inflorescence corymbose, 5–8 cm. broad; peduncles appressed-pubescent, 2–4 cm. long, nearly erect, or narrowly ascending; heads numerous, turbinate-campanulate, 6–7 mm. high; involucral bracts pubescent, the outer narrowly oblong to lanceolate, obtuse, 5.5 mm. long, the inner broadly oblanceolate, sharply acute, 5 mm. long, 2 mm. wide; corolla 3.5 mm. long, nearly cylindric above the narrowed base, its lobes triangular-ovate, acute; pappus-bristles about one half as long as the corolla; achene cuneate-oblanceolate, 4 mm. long, 1.5 mm. wide at the top, scabrous-pubescent, the wings nearly 1 mm. wide above.

In rocky soil, Lover's Leap, Yardley Chase, Santa Cruz Mountains, at 530 meters altitude (*Britton 1144*, Sept. 4, 1907; type; *Harris 9672*). Nearly related to *C. venosus* Urban, from wet woodlands on the summit of John Crow Peak, at 2000 meters altitude. (See Urban, Symb. Ant. **5**: 526.)

15. THE GENUS BADIERA DC.

BADIERA DC. Prodr. **1**: 334. 1824

Type species: *Badiera Penaea* (L.) DC.

Leaves obovate to oblong, 1–4 cm. long, obtuse or emarginate.

Leaves obovate.

Pubescent; leaves 2–2.5 cm. long, papillose-scabrous. 1. *B. Penaea.*

Puberulent, leaves 1.5 cm. long or less.	2. *B. virgata.*
Leaves oblong.	3. *B. oblongata.*
Leaves ovate, oval or ovate-lanceolate, 2.5–9 cm. long.	
Leaves bluntly acuminate, or bluntly acute at the apex.	
Leaves 2–3 times as long as wide.	4. *B. diversifolia.*
Leaves less than twice as long as wide.	5. *B. cubensis.*
Leaves rounded or emarginate at the apex.	6. *B. montana.*
Unknown to me, except from description.	7. *B. Berteriana.*

1. BADIERA PENAEA (L.) DC. Prodr. 1: 335. 1824

Polygala Penaea L. Sp. Pl. 703. 1753.

Polygala domingensis Jacq. Stirp. Am. ed. min. 252. 1788.

Badiera domingensis DC. Prodr. 1: 335. 1824.

Mountains of Haiti and Santo Domingo. This plant is represented in the herbarium of the New York Botanical Garden by the following specimens: "In montibus, Hispaniola (Jacquemont); Sierra del Palo Quemado, Santo Domingo, at 500 meters (*Eggers 1897*); pineland, Marmelade, Haiti, at 900 to 1100 meters (*Nash 719; Nash & Taylor 1312*).

Professor Chodat ignores *Badiera Penaea* in his monograph, and describes *Eggers no. 1897* as *Polygala domingensis*, not recognizing the genus *Badiera*. Mr. Nash's *no. 719*, which is in young fruit, so closely resembles the original figure of *Polygala Penaea* L. (Plumier, ed. Burmann, *pl. 214. f. 1*) that it appears to me the two supposed species must be one; the character cited by De Candolle (Prodr. 1: 335) of flowers solitary in *B. Penaea* and flowers racemose in *B. domingensis* is doubtful; the Plumier figure shows the plant in fruit, and in this as in other species of the genus often only one flower of the cluster produces fruit.

2. **Badiera virgata** sp. nov.

A shrub or small tree up to 4 meters high, the branches nearly erect, densely leafy, the twigs finely puberulent. Leaves obovate, or obovate-oblanceolate, rigid, 10 mm. long or less, 4–8 mm. wide, puberulent or minutely papillose-puberulent, or becoming nearly or quite glabrous when old, rounded at the apex, or some of them slightly emarginate, narrowed at the base, the petioles pubescent, 1–1.5 mm. long, the midvein slightly elevated beneath, the lateral venation wholly obscure; flowers several in the axillary clusters or solitary, yellow-green, 2 mm. long; fruiting pedicels 1.5 mm. long; fruit 5 mm. long, the lobes narrowly winged (only imperfect ones with one lobe developed seen).

Thickets in dry soil, Oriente, Camagüey, and Santa Clara, Cuba. (Type, *Britton 2086*, from United States Naval Station, Guantanamo Bay, March 17–30, 1909.)

3. BADIERA OBLONGATA N. L. Britton, Bull. N. Y. Bot. Gard. **5**: 314. 1907

DISTRIBUTION: Bahama Islands: Andros, New Providence, Cat Island, Acklin's Island, Crooked Island, Watling's Island, Caicos Islands; Cayo Sabinal and mainland of Camagüey, Cuba (*Shafer 878 1085, 977*; also collected in Cuba by Wright, *no. 115* in part).

The Cuban specimens here referred have leaves mostly more obtuse at the base than those of the typical Bahamian plant, but a specimen from Andros Island (*Small & Carter 8681*) seems to be identical with them.

A plant from the palm barren at Santa Clara, Cuba (*Britton & Wilson 6066*), has shorter emarginate leaves 12–20 mm. long, with the midvein deeply impressed above; it is tentatively referred to this species.

4. BADIERA DIVERSIFOLIA (L.) DC. Prodr. **1**: 334. 1824

Polygala diversifolia L. Sp. Pl. 703. 1753.

Polygala jamaicensis Chodat, Mém. Soc. Phys. Genève **31**[2]: 11. 1893.

Jamaica, in hillside thickets and woodlands in relatively dry districts from sea level up to 1100 meters elevation.

5. **Badiera cubensis** sp. nov.

Polygala diversifolia Chodat, Mém. Soc. Phys. Genève **31**[2]: 10. 1893. Not L.

Leaves ovate to elliptic, 2.5–6 cm. long, 1.5–3.5 cm. wide, bluntly acuminate or acute at the apex, cuneate-narrowed or acute at the base; fruit 7.5–8.5 mm. long, 10 mm. wide, lobed to about one third, the lobes rounded.

Cuban woodlands; type, *Wright, no. 1913* from "La loma pelada, Dec. 27," in herb. N. Y. Bot. Gard.; also collected by Wright at "La Sabanilla" and distributed under this same number; Wright's *no. 3496* belongs to this species, and also part of his *115*, collected in eastern Cuba.

Professor Chodat indicates this Cuban species as occurring also in Jamaica, but this I take to be an error.

6. **Badiera montana** sp. nov.

A shrub, 3 m. high, the twigs densely puberulent. Leaves broadly oval, 4–5 cm. long, 2.5–3.5 cm. wide, firm in texture, quite densely puberulent when unfolding and sparingly puberulent when mature, rounded or slightly emarginate at the apex, acutish at the base, dull dark green, the midvein slightly impressed in the upper surface, elevated on the underside, the lateral veins few, slender, the rather stout puberulent petioles 2–3 mm. long; inflorescence several-flowered; bracts ovate, acute, pubescent, about 0.5 mm. long; fruiting pedicels pubescent, 1.5–2 mm. long; stipe of the fruit 1 mm. long; fruit 8–10 mm. long, 10–12 mm. wide at the top, puberulent, lobed to about one fifth, the lobes rounded-truncate.

Rocky wooded hill, Arroyo Grande, Trinidad Mountains, Cuba, at about 700 meters altitude (*Britton & Wilson 5461*, March 11, 12, 1910).

Differs from *B. cubensis* by its obtuse leaves, larger and longer fruit.

7. BADIERA BERTERIANA Spreng. Syst. **3**: 172. 1826

Described as with oblong-lanceolate obtuse leaves and recorded as from Hispaniola. Professor Chodat does not refer to this species in his monograph; it was collected by Bertero and called by him *Polygala domingensis*, but Sprengel's description indicates that it is not *Polygala domingensis* of Jacquin, here referred to *Badiera Penaea* (L.) DC.

EXCLUDED SPECIES.

Badiera (?) *acuminata* (Willd.) DC. Prodr. **1**: 335 is POLYGALA ACUMINATA Willd. Sp. Pl. **3**: 887, native of Peru and Chile. Professor Chodat describes it as new in his monograph (p. 46), but the name dates from at least the year 1803.

Badiera (?) *divaricata* DC. Prodr. **1**: 335, from Para, South America (presumably Brazil), was not taken up by Mr. A. W. Bennett in the Flora Brasiliensis.

Discoid gemmae in the leafy hepatics of New England

NEIL E. STEVENS

The gemmae found among the leafy Jungermanniales belong, with very few exceptions, to two distinct types. Those of the simpler type are unicellular or bicellular bodies which arise, generally in clusters, from the leaves or from the stem in the region of the apex. Those of the second type are discoid, multicellular bodies which are borne either on the margins or the surfaces of the leaves. The formation of the simpler type of gemma seems often to be associated with limitation of growth, for when the gemmae are borne on the stem the entire growing point goes over to the production of gemmae. The production of discoid gemmae, however, rarely seems to affect the growth of the plant to any marked degree. Gemmae of the simple type are of much more frequent occurrence, especially among northern forms, and are found in the vast majority of the gemmiparous New England species. Discoid gemmae occur, on the other hand, chiefly among the tropical epiphyllous forms. In New England they are known in only two species, *Cololejeunea Biddlecomiae* (Aust.) Evans and *Radula complanata* (L.) Dumort. According to Nees von Esenbeck discoid gemmae occur also on *Lejeunea cavifolia* (Ehrh.) Lindb. (*L. serpyllifolia* Lib.), but as he describes them, they represent here actual pieces of the leaf which become separated and are therefore hardly to be considered differentiated gemmae.

In the present paper the development and structure of the gemmae of *Cololejeunea Biddlecomiae* and *Radula complanata* are discussed. Both of these species are widely distributed in North America, and *Radula complanata* occurs also in Europe, Asia, and northern Africa. The material used in the study of *Cololejeunea Biddlecomiae* was collected by the writer in Woodbridge, Connecticut, in March. Material from Superior, Wisconsin, collected in August by G. H. Conklin, was used for comparison. The material of *Radula complanata* was collected in North Haven, Conn., in October, specimens collected at Woodbridge, Conn.,

in March, and at Lentz, Switzerland in September, being used for comparison. All the *Radula* material used was collected by Professor A. W. Evans.

But little has been written concerning the gemmae of the leafy Jungermanniales. In the tropical genus *Cyclolejeunea*, however, the gemmae have been described by Evans in four species. In *Cololejeunea* the development and structure of the gemmae have been described by Goebel in the Javan *C. Goebelii* (Gottsche) Schiffn. and by Cavers in the European *C. calcarea* (Lib.) Schiffn. For *Radula* the development of the gemmae has also been briefly treated by Goebel in two Javan species, *R. Hedingeri* Goeb. and *R. tjibodensis* Goeb., and by Cavers in *R. complanata*.

COLOLEJEUNEA BIDDLECOMIAE.

The gemmae in *Cololejeunea Biddlecomiae* are borne on the surface of the leaves, most frequently on the lower surface of the lobes, occasionally on the upper surface and never, at least in the material examined, on the lobules. Usually only a few, not more than five or six, are borne on a single leaf. Gemmae appear to be of rather general occurrence in this species, though only a comparatively small proportion of the plants in any individual mat are gemmiparous and plants bearing a considerable number of gemmae are found closely associated with plants having none. Gemmae are found more abundantly on sterile plants, but the presence of sexual organs by no means prevents the formation of gemmae. In fact they are found occasionally on the bracts, but never, so far as could be determined, on the perianths.

In the formation of a gemma a leaf cell first projects beyond the surface of the leaf and the projecting portion is cut off by a wall parallel to the leaf surface. The outer cell, which is nearly circular in outline, becomes the mother-cell of the gemma, while the inner one may be regarded as a stalk. The gemma mother-cell then undergoes a series of regular divisions by walls perpendicular to the surface of the leaf. The first wall divides it into two approximately equal parts (FIG. 1, A) and each of the semicircular cells then divides by a wall perpendicular to the first, so that the gemma in the four-celled stage consists at first of approximately equal quadrants (FIG. 1, B).

One of these quadrants in each half usually grows more rapidly than its sister cell and thus displaces the wall separating them, so that each half of the gemma soon consists of two unequal cells symmetrically placed with respect to the median wall (FIG. 1, C). Each of the larger cells then begins to function as a two-sided apical cell (FIG. 1, D and E) and cuts off three segments, the first by a wall approximately parallel to the median wall. Each segment in turn divides by a periclinal wall and the outer cell of the first segment divides further by an anticlinal wall. Each of the

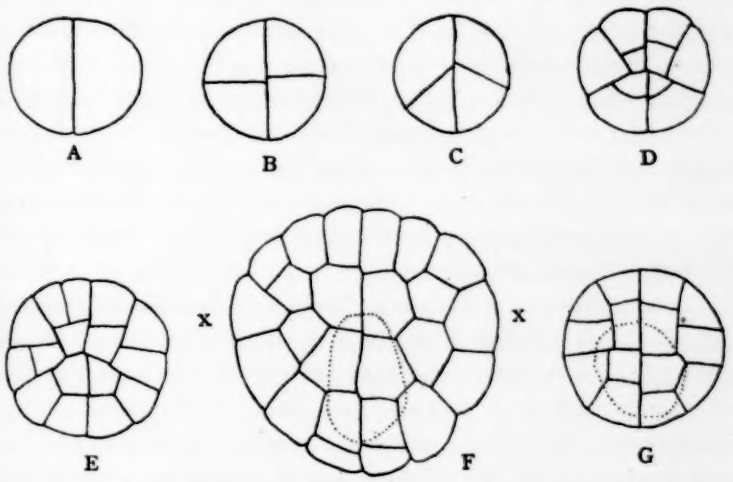

FIGURE 1. A–F. *Cololejeunea Biddlecomiae*. A–E. Gemmae in various stages of development, × 600. F. A gemma about ready to separate (x, apical cell), × 600. G. *Cololejeunea calcarea*. A gemma in which the basal and apical quadrants are nearly equal, × 600.

smaller, or basal, cells also divides regularly. The cell divisions normally take place exactly as they do in the first apical segment, so that each basal portion of the mature gemma contains three cells (FIG. 1, D and E). Occasionally, however, one of the outer cells divides again by a periclinal wall (FIG. 1, F).

The gemmae increase in size somewhat, after cell division has ceased, by the growth of the cells themselves; and this growth continues, for a time, after the gemmae are shed. This is clearly shown by the fact that the gemma, at the time it is shed, is about 0.035 mm. in diameter, while it is common to find gemmae loose

in the material containing precisely the same number of cells, yet having a diameter of 0.055 mm. or more. The cells of the gemma meanwhile increase proportionately in size, that is, from about 7 μ to about 12 μ in average diameter or to slightly less than the average diameter of the cells of the lobe.

A mature gemma is typically a flat disc consisting of a single layer of cells and showing no indication of dorsi-ventral differentiation. It is composed of symmetrical halves, each consisting of eleven or twelve cells. In each half eight of these cells come from the apical cell and its three segments and three or four come from the basal cell (FIG. 1, F). The gemma is regular in outline, without marginal hairs or other projecting cells, and there is no indication of rhizoids or other organs of attachment such as described by Goebel in the epiphyllous *C. Goebelii*. The one-celled stalk is attached to the gemma along the median line in the basal region (FIG. 1, F and G). The separation of the gemma takes place as in other *Lejeuneae* by the splitting of the cell wall between the stalk cell and the gemma.

The above description agrees closely with Goebel's account (50, *f. 55*) of the development of the gemma in *Cololejeunea Goebelii*, except that he describes the first anticlinal wall as dividing the semicircular cell into unequal portions. This condition in *C. Biddlecomiae*, at least, seems to be secondary, due to the more rapid growth of the cells which are to function as apical cells. This appears from the fact that the condition of equal quadrants (FIG. 1, B) is of frequent occurrence in the four-celled stages observed.

The development of the gemmae in *Cololejeunea Biddlecomiae*, as traced by the writer, differs in several respects from that figured by Cavers (160, *f. 8*) in the closely related *C. calcarea*. Cavers figures the cell divisions as taking place by cell walls parallel to and at right angles to the median line, without reference to an apical cell, and implies that the mature gemmae differ from those of *C. Goebelii* in not having an apical cell. He states also that the stalk cell is inserted at the center of the gemma. In order to determine whether *C. calcarea* really differs from other members of the genus in these respects, material from Pottenstein in Upper Franconia, Germany, collected by Arnold (Hep. Europ. *283b*)

was examined. This showed that the gemmae of the two species are essentially alike in their development, form, and method of attachment. One immature gemma of *C. calcarea*, however, was found in which the first anticlinal walls had not been displaced by the growth of the apical cells (FIG. 1, *G*). The basal and apical quadrants are thus nearly equal, and the gemma as a whole appears more like those figured by Cavers. It is very probable that it was from such a condition as this that his figures were taken.

RADULA COMPLANATA.

In *Radula complanata* the gemmae are borne on the edges of the leaves, frequently at right angles to the leaf surface. A single leaf often bears a considerable number of gemmae and it is common to find leaves where every cell for a considerable portion of the margin has given rise to a gemma. Gemmae are of more frequent occurrence in *R. complanata* than in most species. In fact so general is their occurrence that it is comparatively rare to find well-developed plants which do not bear gemmae. Moreover, it is evident that there can be here no such antagonism between the production of gemmae and of sexual organs as has been supposed by some writers, for the gemmae are frequently borne on the edge of the perianth itself, as well as on the bracts.

Each gemma arises from a single marginal cell, which projects beyond the cells on either side and becomes at once the mother-cell of the gemma. This cell as it increases in size secretes a gelatinous substance which may be noted around the edge of the cell. The secretion of this gelatinous substance appears to be characteristic of rapidly growing cells in the gemma and the occurrence of gelatinous material in considerable quantity may be taken as a rough indication of the region of most rapid cell division (FIG. 2, *A*, *C*, and *D*; FIG. 3, *A*; and FIG. 4, *A* and *C*). The gemma mother-cell divides first by a periclinal wall (FIG. 2, *A*). This wall is sometimes perpendicular to the surface of the leaf, but is more often so inclined that the outer of the two cells, which is generally the larger, overlies a portion of the inner cell. The outer cell, which gives rise to the main portion of the gemma, divides first by a longitudinal wall (FIG. 2, *B*). The inner cell divides later by a longitudinal wall and forms the two-celled basal

portion of the gemma, which may be regarded as a poorly defined stalk.

The two cells formed by the division of the outer cell behave as more or less independent portions. They divide without very definite order by transverse and longitudinal walls (FIG. 2, *C*) and soon a wedge-shaped cell is cut off in one (FIG. 2, *D*) or both (FIG. 2, *E*) of the portions. These cells function for a while as two-sided apical cells. The irregular occurrence and behavior

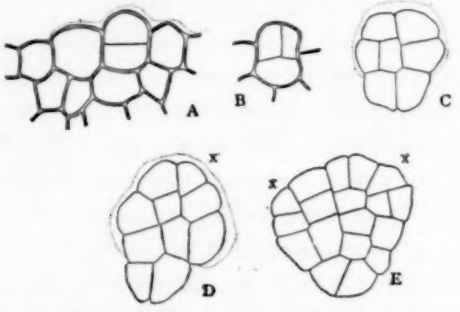

FIGURE 2. *Radula complanata*. *A–C*. Gemmae in early stages of development, × 300. *D*. Gemma that has formed one apical cell, × 300. *E*. Gemma with two apical cells, × 300. Dotted line indicates gelatinous secretion.

of these apical cells gives rise to the considerable variation in form which is to be observed in the gemmae of *Radula complanata*. For both portions may cut off apical cells at the same time and develop with equal rapidity, thus forming a symmetrical gemma, or one segment only may form an apical cell, in which case the segment which has no apical cell will develop very little and will be more or less crowded out of position. Such a gemma is shown in FIG. 3, *A*. One portion has here developed an apical cell which has cut off six segments. This portion has increased by further cell divisions until it is composed of twenty-three cells, while the portion having no apical cell is composed of but four cells.

Moreover, the apical cells do not persist until the gemma is mature; but, after cutting off segments in regular succession for a time, lose their capacity of regular segmentation and divide by a periclinal wall (FIG. 3, *B* and *C*). After this first periclinal division the apical cell divides like other cells by longitudinal and

transverse walls, but the segments which have arisen directly from the division of an apical cell may generally be traced by their position in the mature gemma. In gemmae having two apical cells one may continue to function as an apical cell after the other has lost its power of regular segmentation and has begun to divide by periclinal and anticlinal walls (FIG. 3, *D*). This gives rise to still greater irregularity in the mature gemmae. The usual position of the mature gemmae, at right angles to the plane of the leaf, seems to be due to the crowding of the gemmae as they increase in size. For the gemmae are at first in the plane of the leaf and remain so in places where they are not close together.

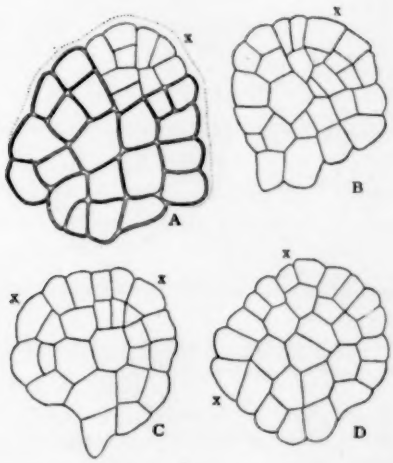

FIGURE 3. *Radula complanata*. *A*. Gemma with one apical cell. *B–D*. Gemmae in which the apical cells have ceased to cut off regular segments and have divided irregularly. × 300.

The active division of an apical cell tends to inhibit the division of other cells in the gemma. This appears from the fact that when one apical cell is present the portion lacking an apical cell exhibits very little cell division. It is shown still more strikingly, however, by the fact that about the time the apical cell loses its power of active segmentation the older cells of the gemma begin to divide by walls parallel to the surface.

A mature gemma, that is, one ready to fall from the leaf is thus typically two cells thick for a considerable part of its extent (FIG.

4, *A* and *B*). The marginal cells, however, rarely divide by walls parallel to the surface and the basal cells never take part in this division. In this respect *R. complanata* apparently differs markedly from other members of its group. For in all the other leafy Jungermanniales thus far observed, which bear thalloid gemmae, the gemmae are but one cell thick throughout (Evans, 298).

In the mode of separation of the gemmae, also, *Radula complanata* differs from many other leafy Jungermanniales. For while the separation is schizolytic, the splitting takes place in the wall between the basal cells and the cells of the leaf. The two-celled

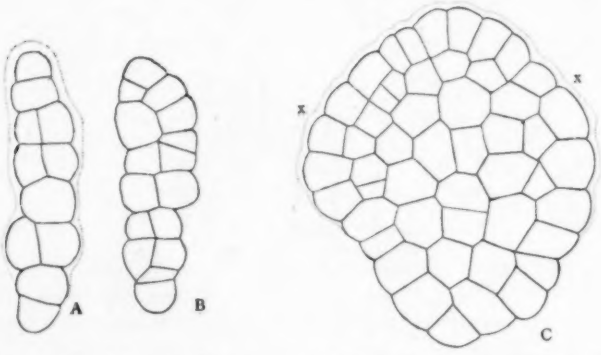

FIGURE 4. *Radula complanata*. *A* and *B*. Mature gemmae in optical rection. *C*. Surface view of mature gemma. × 300.

stalk is thus retained as a part of the mature gemma when it falls from the plant. This is very different from the condition found in *Cololejeunea*, where the separation takes place between the gemma and the stalk cell. A similar difference has been noted by Evans (277, 284, *f. 4, 9*) in the separation of the gemmae in *Metzgeria*. In *M. crassipilis*, for example, the gemmae are set free by a splitting of the wall between the gemma and the cell cut off by the original horizontal wall, while in *M. furcata* separation takes place by the basal cells splitting away from the adjacent thallus cells.

In no case was a mature gemma observed which still retained an apical cell. This is contrary to the statement of Cavers (159) that the mature gemma "shows on its distal margin a large apical cell, triangular in surface view."

The development of the gemmae in *Radula complanata* differs considerably from that of *R. Hedingeri* as described by Goebel (52). He states that the gemma mother-cell divides by a number of longitudinal walls between which transverse walls are formed and that no apical cell is developed in the gemma. That this is not the case in *R. complanata* is clear from the almost invariable occurrence of apical cells in the young stages observed, and from the fact that in mature gemmae the position of the apical cell may generally be traced. FIG. 4, *C*, shows what may be considered a typical gemma. In this the outlines of the two apical cells with their segments may be clearly traced though each of the apical cells has become divided into five cells.

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Notes on Rosaceae — III

Per Axel Rydberg

POTENTILLA

If we were trying to trace the origin of the name *Potentilla*, we should probably find that the name belonged to *Potentilla Anserina* L., or *Argentina Anserina* of the North American Flora. There is no doubt but that very species was the plant usually referred to by the name *Potentilla* among the pre-Linnaean botanists, although other species, as for instance *P. reptans* L., sometimes were meant. As our nomenclature begins with Linnaeus, it concerns us very little, however, what his predecessors named plants. The question that most concerns us is, What application did Linnaeus make of the name *Potentilla?* We know that Linnaeus often adopted names from earlier authors and used them in an entirely different meaning.

As stated before, our nomenclature begins with Linnaeus, and we have agreed to adopt the Species Plantarum of 1753 as the starting point of generic as well as of specific names. As the Species Plantarum does not give any characterization of the genera, and as there are found only a few exceptional cases in which types are assigned, it is necessary to turn to other works of Linnaeus, in order to find his real conception of a certain genus at that time. The best book for this purpose is the fifth edition of his Genera Plantarum, published in the following year. In this we find on page 219 that the genus no. 559, *Potentilla*, was not adopted from anybody else. In other words, whatever the origin of the name *Potentilla* might have been, the concept of the genus originated with Linnaeus himself.* He based it on *Quinquefolium* Tourn. and *Pentaphylloides* Tourn. As *Quinquefolium* is the first of these two synonyms and the only one accompanied by an illustration,† also cited by Linnaeus, we can not help but regard the

*Linnaeus had the same concept even before the publication of the Species Plantarum, for his genus *Potentilla* remained unchanged in his Genera Plantarum from the first edition to the seventeenth, the last one printed during his lifetime.

†Tourn. Inst. *pl. 153.*

type of *Quinquefolium* Tourn. the type of *Potentilla* L. The plant figured by Tournefort is *Potentilla reptans* L. Tournefort had adopted the name *Quinquefolium* from Caspar Bauhin.* The latter referred directly to the *Pentaphyllon* (πενταφυλλον) of Dioscorides and Theophrastus and Pliny's *Quinquefolium*, all evidently the official plant *Potentilla reptans*. The plate in Dioscorides (Codex Vindobonensis, of which there is a photographic facsimile copy in the library of the New York Botanical Garden) may very well represent *P. reptans*, or at least a species of *Potentilla* with digitately 5-foliolate leaves, 5 petals, and decumbent stem, rooting at the nodes.

A few botanists are inclined to regard the first species mentioned as the type of the genus. The first species of *Potentilla* is *P. fruticosa* L., but this was not a part of Tournefort's *Quinquefolium*. The first Tournefortian species of that genus, cited by Linnaeus, is *P. recta*, and the first Linnaean species given in Tournefort's Institutiones, is *P. alba;* but neither of these agrees with Tournefort's plate, nor can they be traced back to the old Greek and Latin writers, from whom Tournefort adopted the name *Quinquefolium*. There is therefore no species which can dispute the right of *P. reptans* as being regarded as the type of *Potentilla*, except *P. Anserina*, and the latter can do so only if we admit a pre-Linnaean starting point of our nomenclature.

The type of *Tormentilla* L.† is *T. erecta* L., or *Potentilla Tormentilla*, a 4-merous species of the same group as *P. reptans*.

The type of *Quinquefolia* (Tourn.) Adans.‡ and of *Pentaphyllum* Gaertn.,§ is of course also *P. reptans*. The proposing of another genus *Callionia* Greene‖ was, of course, altogether superfluous, for its type, *Potentilla canadensis* L., is so closely related to *P. reptans* that no scientist would seriously think of placing them in different genera. In proposing *Callionia*, the author says: "If *Argentina* be separated from *Potentilla*, it is by habit and inflorescence alone and from this there seems to follow necessarily the conceding of equal rank to what I shall call *Callionia*."

*Pinax 325.
†Sp. Pl. 500. 1753.
‡Fam. Pl. 2: 295. 1763.
§Fruct. 1: 349. 1788.
‖Leaflets 1: 238. 1906.

Even if there were no structural differences in the flowers of *Argentina* and *Potentilla* (which, however, exist), there are not even any essential habitual differences between *P. canadensis*, *P. simplex*, and *P. pumila* on one hand, and *P. reptans*, *P. procumbens*, and *P. Tormentilla* on the other.

Dactylophyllum Spenner* was a merging of *Potentilla*, *Fragaria*, *Sibbaldia*, etc., without any real type.

The types of *Chamaephyton*, *Dynamidium*, and *Hypargyreum* Fourr.† are *Potentilla supina* L., *P. verna* L., and *P. argentea* L., respectively. Fourrier also proposed several other genera, of which *Drymocallis* was adopted by me for *P. rupestris*, *P. glandulosa*, and their allies. The rest of Fourrier's genera are not represented by American species. Whether they should be regarded as distinct genera or not, can be decided only by further study, and was out of the scope of the North American Flora.

The monotype of *Potentillopsis* Opiz is *Potentilla pentandra* Engelm.

Tridophyllum Necker‡ has no type. It was based on the trifoliolate species of *Potentilla* L., of what book of Linnaeus Necker does not state under *Tridophyllum;* but on page 94 we find that he had in mind the 14th edition of the Systema. This mattered little, however, in this case, because this division of *Potentilla* remained unchanged from the first edition of the Species Plantarum to the 14th edition of the Systema, the first and the last of the works of Linnaeus that Necker possibly could have had. The group contained *P. monspeliensis*, *P. norvegica*, *P. nivea*, *P. grandiflora*, and *P. subacaulis*. Only the two first belong to *Tridophyllum*, as modified by Dr. Greene.§ He states: "Among all segregated genera that have been proposed, not one is better entitled to the rank of a genus than Necker's *Tridophyllum*. As its name indicates, it is founded upon species of Linnaean *Potentilla* having trifoliate leaves. But this mark of the foliage is not one which is considered essential. He makes the generic rank of the group to rest on the very small ovaries, greatly reduced styles and minute naked achenes. The so-called Potentillas that

*Fl. Frib. 1084. 1829.

†Ann. Soc. Linn. Lyon II. **16**: 371. 1868.

‡Elem. 2: 93. 1790.

§Leaflets 1: 188. 1905.

evince these characters have other marks more obvious. Their roots are annual, or now and then of biennial duration. All other plants that ever were referred to *Potentilla* are perennial, and very many suffrutescent." So far, Dr. Greene. Let us see of what value these characters are. *Potentilla nivea*, *P. grandiflora*, and *P. subacaulis*, also trifoliolate species of the Linnaean *Potentilla*, and hence part of *Tridophyllum* Necker, do not fulfill this characterization. Some may claim that they did not constitute a part of Necker's genus, but why not? Necker placed the pinnate-leaved species in *Potentilla*, the trifoliolate ones in *Tridophyllum*, and the digitate-leaved ones with more than three leaflets he transferred to *Tormentilla*. In a note under *Tormentilla* he states that 5 species of *Potentilla* are to be referred to *Tridophyllum;* hence the five given above, of which *P. subacaulis* has very long styles and the other two have rather large achenes. They are all three perennials.

But is *Tridophyllum* as modified by Greene a well-defined genus? *Potentilla intermedia* and *P. heterosepala* have both the very short styles and numerous small achenes, and are both included in the SUPINAE group by Dr. Wolf, the world-authority on *Potentilla;* but they are both perennials. The former is very close in habit to *P. monspeliensis*, which occasionally is a short-lived perennial. *Potentilla Newberryi* has all the character of that group, but the style is long. The short style, often glandular at the base, and the numerous small achenes, characteristic of the SUPINAE group, are found in many other Potentillas, especially of the MULTIFIDAE group. These characters are worth little as generic characters.

While vol. 25, part 4, of the North American Flora was going through the press, we received at the New York Botanical Garden the excellent monograph of the genus *Potentilla* by Dr. Theodor Wolf.* If this valuable work had reached us a little earlier, some changes and corrections might have been made in my monograph, and quite a number of synonyms could have been added. The monographing of the whole genus, for the whole world, is a stupendous undertaking. Dr. Wolf's work is one of the most elaborate, conscientious, and critical ever published. It is a large

*Bibliotheca Botanica, Heft 71.

quarto of 716 pages and 20 plates, good paper and good large print. The descriptions in Latin are excellent and complete. To these are added elaborate discussions and notes in German. The synonymy is practically complete, and the citations have nothing of the vagueness so characteristic of many so-called monographs.

As one should expect, a comparison of Dr. Wolf's monograph and my treatment of the genus in the North American Flora discloses many differences; but most of these result from our different views. Dr. Wolf is exceedingly conservative both as to genera and species, and the present writer has the reputation of being exceedingly "radical." Dr. Wolf believes in large genera and broad species, and admits numerous varieties and forms; while the writer believes in small genera and narrowly limited species. If the diversity of two plant forms is of any value at all, the writer admits them as distinct species; if the variation is a trifling one, it is simply ignored. In this way the old rank of variety has been disposed of. Of course, also, many of the differences arise from the fact that Dr. Wolf had no or insufficient material of American plants and had to rely upon the printed descriptions alone in many cases.

While Dr. Greene seems to go too far in splitting up the genus, Dr. Wolf is in my opinion too conservative. He has left *Potentilla* with about the same limitation as Lehmann had in 1856, only that he has merged even *Duchesnea* in *Potentilla*. I can not understand why he did not treat *Sibbaldia* in the same way. This genus is really much more related to *Potentilla* than *Drymocallis* and *Dasiphora* are. The only distinctions given by Dr. Wolf are: "Stamens 5 (very seldom 10); carpels 5–15 (the few Potentillas with only 5 stamens have always numerous carpels)." But there are several Potentillas that have few carpels although they have 10–20 stamens. The distinctions are therefore not well drawn. Of course the position of the style, which I have used as a generically distinctive character, will place it outside of *Potentilla* proper and in the group with *Dasiphora*. Dr. Wolf, however, does not regard this as a generic character and therefore, if consistent, he should have merged *Sibbaldia* into *Potentilla*.

Dr. Wolf has divided the genus *Potentilla* into 2 sections and 6 subsections. These subsections are based on the differentiation

of the styles. It is practically the same character as I used in distinguishing the genera, only that I placed more importance on the position and Dr. Wolf on the form of the style. I also took the stamens into consideration, which Dr. Wolf only incidentally mentions. Dr. Wolf's RHOPALOSTYLAE correspond to my genus *Dasiphora*. His NEMATOSTYLAE correspond to *Sibbaldiopsis* and *Comarum*, together with several groups not American and therefore not treated by me. These two subsections constitute his section POTENTILLAE TRICHOCARPAE. It is evident that *Comarum* (*Potentilla palustris* of his monograph) should not be counted in this section, as the carpels are perfectly naked. He associates *P. palustris*, a herbaceous plant with creeping rootstock and glabrous achenes, with *P. Salesowiana*, a shrub with hairy achenes. While the latter is in its right position in the system, the former is not. I shall discuss this further under the genus *Comarum*. To Dr. Wolf's POTENTILLAE GYMNOCARPAE belong the rest of the subsections. CLOSTEROSTYLAE correspond to the genus *Drymocallis* and LEPTOSTYLAE to *Argentina*. The subsections CONOSTYLAE and GOMPHOSTYLAE show so many intergradations, a fact admitted by Dr. Wolf, that there is no ground, in my opinion, for keeping them apart. They constitute what I have called *Potentilla*. In the main points Dr. Wolf and myself agree, the only difference being that what he calls subsections, I call genera. I can not help, however, but accuse Dr. Wolf of inconsistency, for *Sibbaldia*, *Fragaria*, *Horkelia*, *Comarella*, and *Stellariopsis*, all admitted by Dr. Wolf, are none of them better genera than these subsections.

Now let us take up the different groups of *Potentilla* in the order they are in the North American Flora.

TORMENTILLAE

This contains six species, of which two, *Potentilla reptans* and *P. procumbens*, are introduced. Dr. Wolf admits only one North American species, regarding *P. pumila* and *P. simplex* as varieties of *P. canadensis*. *Potentilla caroliniana* was evidently unknown to him. Regarding *P. pumila*, he states that I regarded it in 1898 as a distinct species but withdrew the rank in 1899 (refering to the Bulletin of the Torrey Botanical Club for that year,

page 25), after Clute had reported *P. canadensis* and *P. pumila* as growing together on the sand barrens of Long Island and were "connected through intermediate forms." The page referred to contains the proceedings of the Club. I had nothing to do with it and my name was not even mentioned. Clute's report on the sand barren flora contains a statement very opposite to what Dr. Wolf gives, viz.: "*Potentilla pumila* and *P. canadensis* growing together without intermediate forms." Robinson and Fernald, who give *Potentilla* a very conservative treatment in Gray's New Manual, keep them distinct, although they regard *P. simplex* a variety of *P. canadensis*. I for some time thought that an additional species could be distinguished from *P. canadensis*, viz., the plant common in the lower Mississippi Valley. This has much thicker and more shining leaves and usually longer bractlets than the common *P. canadensis* of the North Atlantic States, but these characters were found to be too unstable and the plant grades so into the typical form that the idea was given up.

HETEROSEPALAE

This group contains only one species from Mexico and Central America. Dr. Wolf refers it to the SUPINAE group, perhaps rightly so.

SUPINAE

In the North American Flora 12 species are admitted. Of these, *Potentilla rivalis*, *P. millegrana*, *P. biennis*, *P. michoacana* and *P. pentandra* are regarded by Dr. Wolf as distinct species; and *P. paradoxa* and *P. monspeliensis* are regarded as varieties of the European *P. supina* and *P. norvegica* respectively. *P. Nicolletii* is made a mere form (f. *decumbens*) of *P. supina paradoxa*. A comparison between this treatment and the one in Gray's New Manual is rather interesting. In that publication *P. Nicolletii* is regarded as a good species, while *P. millegrana* and *P. pentandra* are made varieties of *P. rivalis*. Whatever may be said, *Potentilla Nicolletii* is a rather weak species, while *P. pentandra* is one of the most distinct in the group. Opiz even based a new genus on the same. It is also interesting to know that the specimen which Sheldon had most in mind when he raised *P. Nicolletii* to specific rank and which he distributed under that name,

was not a specimen of *P. supina Nicolletii* S. Watson or *P. Nicolletii* of my monograph, but of *P. millegrana*.

Dr. Wolf claims that *Potentilla labradorica* Lehm. is but a depauperate form of *P. norvegica hirsuta* (*i. e.*, of *P. monspeliensis*). Lehmann's description, however, suggests another plant, differing from that species not only in the almost complete lack of pubescence but also in the obtuse and oval instead of lanceolate bractlets, the broader obcordate petals and smooth instead of rugulose achenes. It is a subarctic plant and evidently the same as *P. flexuosa* Raf., an older name.

The remaining species, *Potentilla flavovirens*, *P. Kelseyi*, and *P. leurocarpa* were described as new in the North American Flora, and were evidently unknown to Dr. Wolf. They are all three very local. *P. Kelseyi* may be a hybrid between *P. biennis* and *P. monspeliensis*.

ARENICOLAE

This contains only one species, *P. Newberryi*, which Dr. Wolf includes in the preceding group.

ARGENTEAE

This group is a rather artificial one and if I had had Dr. Wolf's monograph at hand when the manuscript was prepared I should have made other arrangements. The group consists of four introduced species. Of these Dr. Wolf has placed *Potentilla intermedia* in the SUPINAE group on account of its short style. It is evidently related to that group and often closely resembles *P. norvegica* but is an evident perennial. Most specimens of this species collected in this country belong to a form with the leaflets more deeply dissected and inclined to be more or less pedately instead of strictly palmately arranged. This form was described as *P. digitato-flabellata*, from seed said to have come from America. Perhaps it is a native and distinct from the European species. I have never seen it growing. It would be worth while for botanists who have the opportunity to see it in the field to give it a thorough study. *P. argentea* is rather common and is found in this country in many forms. I did not take the trouble to try to identify these with the numerous described varieties.

RECTAE

This group contains two closely related introduced species. Dr. Wolf regards them as varieties of one.

HEPTAPHYLLAE

This group consists of a single species, which Dr. Wolf includes in his Grex *Ranunculoides*, a mixture of plants of diverse habits, from the groups *Heptaphyllae*, *Aureae*, *Subviscosae*, *Subcoriaceae* and *Nuttallianae*. In my monograph I had followed S. Watson in calling the species *Potentilla heptaphylla* Mill. It is not closely related to that species. For some years I had known my mistake but did not correct it until I did so in the North American Flora. Dr. Wolf had also noticed it and proposed a new name for the species. As his name is a few months older, the species has to bear the following name and synonymy.

POTENTILLA PALMERI Th. Wolf. Bibl. Bot. **16**: 513. 1908

P. heptaphylla S. Wats. Proc. Am. Acad. **17**: 353; hyponym. 1882.—Rydb. Mem. Dep. Bot. Columbia Univ. **2**: 62. 1898. Not *P. heptaphylla* Mill. 1768.

P. leptophylla Rydb. N. Am. Fl. **22**: 310. N 1908.

NUTTALLIANAE

Coulter and Nelson, in the New Manual of Botany of the Central Rocky Mountains, have reduced *Potentilla brunnescens* Rydb. to a doubtful synonym of *P. pectinisecta*, to which it has indeed very little relationship. Its nearest relative is without doubt *P. Nuttallii*. Dr. Wolf, who is even more conservative as a rule than the authors of the New Manual, admits it as a distinct species, but changes the name to *P. brunescens*, for what reason I do not know. As far as I know, both *brunneus* and *brunnescens* are usually spelled with two *n*'s.

Potentilla Townsendii is placed in the *Ranunculoides* by Dr. Wolf and placed between *P. fragiformis* and *P. Palmeri;* but it is not related at all to either of the two. It has no close relative as far as I know, but must be placed in the group in which I placed it in the North American Flora, unless it is to be regarded as a group by itself.

The only species in North America which resembles it in leaf-form is *P. angustata* Rydberg, proposed as new in the North American Flora, but this is much more closely related to *P. Nuttallii*. It is known only from the type collection.

The new species proposed in this group are *Potentilla angustata*, *P. grosse-serrata*, *P. rectiformis*, *P. amadorensis*, *P. macropetala*, *P. Parishii*, *P. dascia*, and *P. lasia*.

Potentilla grosse-serrata was based partly on material referred by me in my monograph to *P. Blaschkeana*. As treated there, the latter species was composed of a mixture of *P. grosse-serrata*, *P. glomerata* A. Nels., *P. dascia* Rydb., and the true *P. Blaschkeana* Lehm. I shall give a further discussion under the latter species. Some of the more typical specimens of *P. grosse-serrata* are here given:

CALIFORNIA: Donner Lake, 1865, *Torrey 121 (a)*; *Bridges 98;* between Igera and Weed, 1905, *Heller 8092;* (Geological Survey 1860–7) *Rattan 234*.

NEVADA: Ruby Valley, 1868, *S. Watson 339*.

WASHINGTON: *Vasey 322*.

When preparing the manuscript of my original monograph, I had two specimens, rather fragmentary, of *Potentilla rectiformis*. One was doubtfully and hesitatingly referred to *P. recta*, the other to *P. pectinisecta*. The following specimens belong here:

WASHINGTON: Pullman, 1896, *Elmer 29*, "Kuskuske and Fort Vancouver," *Wilkes*.

MONTANA: Spanish Basin, 1897, *Rydberg & Bessey 4379*.

Potentilla amadorensis is known only from the type locality.

Potentilla macropetala resembles much in habit *P. glaucophylla* but has much larger flowers. The stem is also much stouter and and the plant much coarser, wherefore it was placed here rather than in the MACULATAE. To this species I refer the following specimens:

CALIFORNIA: Laguna, 1894, *Schoenfeldt 3576;* 1866, *Bolander 5036;* San Diego, *Palmer*.

OREGON: Tillamook, 1894, *Lloyd*.

Potentilla Parishii is closely related to *P. Hallii* and the first specimens seen were referred to that species by me a few years ago, but it differs in the fine appressed instead of spreading and

coarser pubescence of the stem. The following specimens are referred here:

CALIFORNIA: Descanso, 1897, *Parish 4523;* Cuyamaca Lake, 1903, *Abrams 3871;* San Jacinto Mountains, *Hall 2296;* Fresno County, 1900, *Hall & Chandler 182*, in part; Laguna Mountains, San Diego County, 1904, *Brandegee.*

Some of the specimens belonging to *Potentilla dascia* were included in *P. Blaschkeana* in my monograph. Later I referred them to *P. glomerata* A. Nelson. It is evidently related to the latter, but differs in the open inflorescence and the pubescence, which is much coarser and not at all tomentose, but slightly puberulent as well as hirsute on the lower surface of the leaves. I refer here:

WASHINGTON: 1889, *Vasey 320;* Ellensburg, 1897, *Piper 2736;* Wilson Creek, 1892, *Lake & Hull 518*; Wilson Creek, 1893, *Sandberg & Leiberg 315.*

OREGON: Dalles, 1869, *Harford & Dunn 1144.*

MONTANA: Bozeman, 1892, *Mrs. Alderson*; 1874, *Coues.*

Potentilla lasia is related to *P. Hallii* but is characterized by the few and large teeth of the leaves and the oblong-lanceolate instead of narrowly linear-lanceolate bractlets. To it are referred:

CALIFORNIA: Schwartout Cañon, San Antonio Mountains, 1899, *Hall*; Bear Valley, San Bernardino Mountains, 1894, *Parish 3252;* Los Angeles County, 1899.

Dr. Wolf reduces *Potentilla Hallii* to a variety of *P. gracilis*, evidently without having seen a specimen. This is not the only case he has treated in that way, for in about half the cases where species have been described by later authors, he has reduced them to varieties of what seemed to him the nearest species. In habit the plant resembles much more what Dr. Wolf describes under the name *P. pulcherrima*, than *P. gracilis*, but it lacks tomentum on the lower surface of the leaves and therefore should be placed near *P. etomentosa* in the *Nuttallianae* group.

Dr. Wolf admits *Potentilla etomentosa* as a valid species, citing specimens from Wyoming. Not all species so named from Wyoming belong to *P. etomentosa*, for some are *P. jucunda*. The latter he reduces to a variety of *P. diversifolia*, claiming that he can scarcely separate it from the variety *glaucophylla*. This

statement he bases on specimens received from me, collected at Chambers Lake, Col. In the Chamber's Lake collection, distributed by the Agricultural College of Colorado and named by me, large specimens of *P. glaucophylla* and rather small ones of *P. jucunda* were mixed. I did not notice this fact when the specimens were sent out and Dr. Wolf may have received specimens of the former instead of the latter.

In the New Manual of the Central Rocky Mountains the author of the name *Potentilla jucunda* has reduced it to a synonym of *P. Nuttallii*, but it differs in the total lack of the glandular pruinosity characteristic of that species, in the thinner leaflets, and less prominent veins.

As an appendage of this group, I added two Mexican species, *P. oaxacana* Rydb. and *P. Goldmani* Painter, with thicker leaves and but 5 leaflets to the basal leaves. They are known only from the type localities.

NEW YORK BOTANICAL GARDEN.

INDEX TO AMERICAN BOTANICAL LITERATURE

(1900–1909)

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in its broadest sense.

Reviews, and papers which relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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